

U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF SOILS—MILTON WHITNEY, Chief.

IN COOPERATION WITH THE NORTH CAROLINA DEPARTMENT OF AGRICULTURE,
W. A. GRAHAM, COMMISSIONER; B. W. KILGORE, STATE CHEMIST AND
DIRECTOR AGRICULTURAL EXPERIMENT STATION;
C. B. WILLIAMS, AGRONOMIST.

SOIL SURVEY OF STANLY COUNTY,
NORTH CAROLINA.

BY

R. C. JURNEY, OF THE U. S. DEPARTMENT OF AGRICULTURE,
IN CHARGE, AND S. O. PERKINS, OF THE NORTH
CAROLINA DEPARTMENT OF AGRICULTURE.

W. EDWARD HEARN, INSPECTOR, SOUTHERN DIVISION.

[Advance Sheets—Field Operations of the Bureau of Soils, 1916.]



WASHINGTON:
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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., December 14, 1917.

SIR: Under the cooperative agreement with the North Carolina Department of Agriculture, a soil survey of Stanly County was carried to completion during the field season of 1916.

I have the honor to transmit herewith the manuscript and map covering this work and to recommend their publication as advance sheets of Field Operations of the Bureau of Soils for 1916, as authorized by law.

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

Hon. D. F. HOUSTON,
Secretary of Agriculture.

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SOIL SURVEY OF STANLY COUNTY, NORTH CAROLINA.

By R. C. JURNEY, of the U. S. Department of Agriculture, In Charge, and S. O. PERKINS, of the North Carolina Department of Agriculture.—Area Inspected by W. EDWARD HEARN.

DESCRIPTION OF THE AREA.

Stanly County, North Carolina, lies a short distance southwest of the center of the State, about 15 miles southeast of Salisbury and 25 miles west of Charlotte. It is bounded on the north by Rowan County, on the east by Montgomery County, on the south by Anson and Union Counties, and on the west by Cabarrus County. The Yadkin, and Peedee Rivers¹ form the eastern and Rocky River the southern boundary, giving the county a somewhat irregular outline. It has an area of 408 square miles, or 261,120 acres.

Broadly speaking, the upland of Stanly County is a plateau dissected by the valleys of numerous streams. The topography ranges from level, gently rolling, or rolling to steep, hilly, and mountainous. Beginning just north of Palmerville and extending southeastward along the Yadkin and Peedee Rivers to Parker Mill there is a belt of rough, hilly topography. Along Rocky River and the lower parts of Big Bear Creek, Long Creek, and other creeks emptying into Rocky River the surface is steep or strongly rolling. Rolling to steep and broken land occurs also east and northeast of New London and along Jacobs and Davids Creeks. From Norwood north to the Rowan County line and west to the Cabarrus County line the land is generally rolling, becoming more rolling as the streams are approached. In the region from Mission south to Locust and in the vicinity of Red Cross the interstream topography is level to gently rolling. This section of the county is locally called the "flatwoods." The narrow strips of first-bottom land along the streams are level to gently sloping.

According to data of the United States Geological Survey, the elevation above sea level at Misenheimer is 674 feet, at Richfield 650

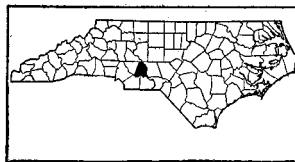


FIG. 1.—Sketch map showing location of the Stanly County area, North Carolina.

¹ The Yadkin and Peedee are names applied to different parts of the same river, the name changing at the point of junction with the Ucharie River.

feet, New London 696 feet, Albemarle 456 feet, Eford 438 feet, Porter 502 feet, and Norwood 363 feet. The northern and western parts of the county are higher than the southern part; the general drainage is to the southeast.

The county is drained through the Yadkin, Peedee, and Rocky Rivers. The Yadkin and Peedee Rivers carry the drainage of the eastern part and the Rocky River that of the western and southern sections. Long and Big Bear Creeks drain the central part. In addition to these main drainage ways, numerous small creeks, branches, and draws extend into all parts of the county, providing adequate and complete drainage. The steep and rolling areas along the rivers and larger streams are excessively drained. The first bottoms along the streams are subject to overflow, but are inundated for only short periods.

The rivers, as well as some of the larger creeks, have cut deep and rather narrow valleys, the channels of the Yadkin, Peedee, and Rocky Rivers lying about 150 to 200 feet below the general level of the uplands. The main channel of the Yadkin and Peedee Rivers varies from about 300 to 1,200 feet in width, and that of the Rocky River from about 250 to 400 feet. These streams are swift flowing and are deepening their channels. Considerable water power is available. At present (December, 1916) a large dam, 210 feet high, is under construction at the "Narrows" of the Yadkin, and surveys for three dams south of this are being made. Power from the Rocky River and Big Bear and Long Creeks is used for running roller mills, saw mills, and cotton gins.

Stanly County was formed from part of Montgomery County in 1841. The early settlers were English, Welsh, and German, and the present inhabitants are chiefly descendants of these pioneers. The population is rather uniformly distributed over the county. The more thickly settled sections are in the vicinities of the larger towns and villages, while settlement along the rivers and creeks, where the topography is unfavorable to agriculture, is sparse. The population of the county is reported in the 1910 census as 19,909, and is all classed as rural. About 11 per cent of the population consists of negroes. There is an average density of settlement of about 48 persons to the square mile.

Albemarle is the county seat and largest town, with a population in 1910 of 2,116. It is the chief trading point of the county and the center of a large cotton-goods manufacturing industry. Norwood is the second largest town, with a population of about 1,000. Badin, built since 1910, is situated about 7 miles northeast of Albemarle. Large electrical furnaces are being constructed at this place for the purpose of producing aluminum. The power is to be obtained from a hydroelectric plant at the Narrows of the Yadkin River. Smaller

towns are New London, Richfield, and Big Lick. Oakboro and Stanfield are new towns with small populations. These smaller towns are locally important as trading centers.

Railroad facilities are good through the eastern half and the southern part of the county. The Winston-Salem Southbound Railroad extends north and south through the county, connecting at Winston-Salem, N. C., with the Norfolk & Western Railroad, which gives an outlet to northern markets. It also connects at Wadesboro, N. C., with the Atlantic Coast Line, which extends to southern markets. A branch line of the Southern Railway from Salisbury, N. C., enters the northwestern part of the county near Misenheimer and runs southeastward to Norwood. This branch line connects with the main lines of the Southern Railway at Salisbury. The Norfolk Southern crosses the southern part of the county and connects with other railroads at Charlotte and Raleigh, N. C. A branch of the Southern Railway runs from Halls Ferry Junction by way of Whitney to Badin. The Winston-Salem Southbound Railway also uses this track from Whitney to Badin. With the exception of a section west of Albemarle, the county is well supplied with transportation facilities.

Public roads reach practically all sections of the county. These roads are often kept in only fair condition. There are about 25 miles of graded road in the county, principally in the vicinity of Albemarle and Richfield. Little attention is given to road maintenance.

Nearly all parts of the county are supplied with telephone service. Rural mail-delivery routes reach practically all sections. Churches and schoolhouses are located at convenient places throughout the county. Most of these buildings are kept in good repair.

Albemarle, Badin, and Norwood are the chief markets for the farm products of the county. Albemarle is a good market for cotton, and also for wheat and corn. Albemarle and Badin are the principal markets for dairy products, poultry, eggs, vegetables, fruits, pork, and beef. Some cotton is sold at Concord and Charlotte, N. C.

CLIMATE.

The climate of Stanly County is mild and healthful. The summers are long, but not excessively hot, and the winters short, with no extremely cold weather. During the spring and fall the weather usually is ideal for farm work. The mean annual temperature is about 60° F.

The rainfall is adequate for the production of a wide range of crops, and is well distributed through the year. The mean annual rainfall is about 47 inches. The heaviest precipitation occurs in the summer and the lightest in the fall.

The average date of the first killing frost in the fall is about October 23, and that of the last in the spring, April 9. This gives an average growing season of 197 days, which is adequate for the crops commonly grown. The grazing season usually extends from the first part of April to the middle of October.

There is no Weather Bureau station in the county, but the data in the table below, compiled from the records of the station at Salisbury about 15 miles to the north in Rowan County, are representative of climatic conditions in Stanly County:

Normal monthly, seasonal, and annual temperature and precipitation at Salisbury, Rowan County.

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year (1898).	Total amount for the wettest year (1908).
	^{° F.}	^{° F.}	^{° F.}	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>
December.....	42.4	75	6	3.75	1.92	4.53
January.....	41.0	79	6	3.46	1.86	5.09
February.....	41.8	76	-1	4.25	.93	6.02
Winter.....	41.7	79	-1	11.46	4.71	15.64
March.....	51.1	92	16	4.56	5.57	3.93
April.....	59.7	95	20	3.29	2.82	3.20
May.....	69.1	100	30	4.32	2.46	3.20
Spring.....	60.0	100	16	12.17	10.85	10.33
June.....	75.7	103	41	4.57	2.08	2.25
July.....	79.0	102	54	4.87	3.96	7.63
August.....	77.5	102	45	5.32	7.07	9.65
Summer.....	77.4	103	41	14.76	13.11	19.53
September.....	71.7	101	41	3.16	.94	5.13
October.....	59.3	94	23	3.18	2.60	6.83
November.....	50.5	85	11	2.63	3.36	1.97
Fall.....	60.5	101	11	8.97	6.90	13.93
Year.....	59.9	103	-1	47.36	35.57	59.43

AGRICULTURE.

Throughout the history of Stanly County agriculture has been the predominant industry. The first crops were wheat, corn, cotton, and grass. Cotton was grown extensively on a commercial basis after the Civil War. Tobacco was grown to some extent for market, and cattle raising was important, but the latter industry has declined in recent years. Commercial fertilizers have been used in the county

for 50 years or more. The growing of clover for hay and for green manuring was introduced about 15 years ago, and the use of lime for soil improvement is beginning to receive some attention.

The following table gives the acreage of the principal crops in the last four census years:

Acreage of various crops.

Crop.	1880	1890	1900	1910
	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>
Corn.....	22,426	20,178	22,733	23,438
Wheat.....	16,465	16,418	21,977	17,342
Cotton.....	5,878	11,296	11,791	13,049
Oats.....	10,975	13,532	5,107	7,538
Hay and forage.....	1,815	1,395	2,585	2,255

Agriculture in Stanly County at the present time consists mainly of the production of the general farm crops, corn, wheat, cotton, and oats, with some hay and forage. Rye, cowpeas, and sweet potatoes are grown to some extent.

According to the 1910 census, corn occupies a larger acreage than any other crop. It is grown chiefly for subsistence, and the greater part of the crop is fed to work stock on the farms. In sections where cotton is not grown some corn is sold for cash at local mills.

Wheat ranks next to corn in acreage. Most of the wheat produced is ground into flour and consumed at home, but on some farms where cotton is not grown wheat is produced as a money crop and is sold at local mills.

Cotton ranks third in point of acreage, and is the principal money crop. Most of the cotton is sold at Albemarle, where it is manufactured into cotton goods.

Oats are grown principally as feed for the work stock on the farms.

Since 1910 the growing of clover has attained some importance. This crop is now grown in many sections. The fields usually are 2 to 10 acres in size, but range as large as 80 acres. The clover hay is fed to stock on the farms, and the seed is sold or used for re-planting.

The 1910 census reports a total of 39,037 apple trees, 19,940 peach trees, and 1,576 grapevines in the county. On nearly every farm small plats are devoted to garden vegetables, sorghum, sweet potatoes, and Irish potatoes. The products are mainly used at home, but small quantities are sold on the local markets.

In 1909, according to the census, there were 3,165 milch cows, 3,568 other cattle, 6,214 hogs, and 534 sheep in the county. Hogs and milch cows are well distributed over the area, each farm having 1 to 4 hogs and 1 or 2 cows to supply the home with meat, milk, and but-

ter. A few hogs and cattle are slaughtered or sold at Albemarle, Badin, and Norwood, and some fresh meat is sold in the country districts. Considerable meat and lard are shipped into the county. In the northwestern section there are two "cream routes" on which small quantities of cream are collected and shipped to Lexington and Greensboro, N. C., to be made into butter. Some milk and butter are sold at Albemarle and Badin. On practically every farm poultry is kept for home use and for sale at local markets. The census reports 737 calves, 1,324 other cattle, 6,285 hogs, and 113 sheep sold or slaughtered in the county in 1909.

The value of the various agricultural products of the county, as reported in the 1910 census, is given in the following table:

Value of agricultural products.

Cereals.....	\$512, 797
Other grains and seeds.....	2, 754
Hay and forage.....	28, 514
Vegetables.....	54, 635
Fruits and nuts.....	23, 825
All other crops.....	596, 362
Live stock and products:	
Animals sold or slaughtered.....	125, 290
Dairy products, excluding home used.....	51, 770
Poultry and eggs.....	86, 139
Wool, mohair, and goat hair.....	151
Total value.....	\$1, 482, 237

The Georgeville gravelly silt loam, silt loam, and silty clay loam are generally recognized as the best soils for wheat, soy beans, corn, and cotton. The Georgeville silty clay loam is recognized as especially well suited to wheat and clover. The Alamance silt loam is considered a fair soil for wheat, corn, and cotton. The Congaree silt loam is recognized as a good corn and hay soil. The Georgeville gravelly silt loam, shallow phase, the Alamance slate loam, and the Iredell stony loam and loam are not considered well adapted to the general farm crops.

In growing wheat the land is broken and harrowed, and the seed drilled in about October 1-10. Where wheat is seeded between October 10 and 20, clover usually is sown with it. Some farmers sow clover in wheat during the spring. The wheat usually is cut the first part of June, and either shocked in the field or stored in the barn to be thrashed later. The first crop of clover is cut for hay. The second cutting is left for seed or green manuring. For corn and cotton the land is broken and prepared in the spring, and the crops seeded in April after the danger of frost is past. Both cotton and corn are planted in shallow furrows 3 to 4 feet apart. Later the seed beds are slightly ridged. Corn usually is cultivated three

or four times with riding or walking cultivators. Cowpeas frequently are sown between the rows. Sodium nitrate is used in a few cases to stimulate the growth of corn. The crop usually matures about the last of September. The ears are then pulled, hauled to the barn, and later shucked. Cotton is cultivated three or four times, or as often as may be necessary to keep the fields clear of weeds and crab grass. Some of the best farmers plant corn and cotton following a winter cover crop of clover. Where grown for seed the clover usually is kept on the land two years, and the seed is gathered from the second cutting.

The farmhouses of Stanly County are, as a rule, substantial. The barns usually are small, but most of them are kept in good repair. There are some large, modern barns. The fences are chiefly of barbed wire, but a few rail fences remain in use. Modern farm machinery is in general use. It includes disk plows and harrows, two-horse turning plows, grain drills, corn and cotton planters, hay rakes and mowers, wheat harvesters, spike-tooth harrows, rollers, clod breakers, and cultivators, with a few lime distributors and clover thrashers. There are several thrashing machines for wheat and oats. In the western part of the county the half-shovel one-horse plow is still in common use.

The work stock consists of horses and mules. These work animals usually are well cared for. The milch cows are principally Jersey, with some Holstein, Guernsey, and mixed breeds. The hogs are Poland China, Duroc, Berkshire, or mixed stock.

Some form of crop rotation is practiced by many of the best farmers, some of whom sow clover in the wheat fields in the fall or spring, following this the next year with corn. Another rotation consists of corn, wheat, and peas or clover. Some farmers, after growing cotton two years, sow wheat, which is followed by cowpeas, oats, or clover. In many cases corn and cotton are alternated without the use of clover or cowpeas.

Over 83 per cent of the farms in the county report an expenditure for fertilizer in 1909, the outlay averaging \$38 each. The most commonly used fertilizer is a home mixture of 16 per cent acid phosphate and cottonseed meal, but commercial fertilizers analyzing 8—2—0,¹ 8—3—0, 9—1—0, or 10—2—0 are utilized to some extent. These fertilizers are applied to the different crops without much regard to their individual needs. As a rule, an application of 200 to 400 pounds per acre is made for corn, wheat, or cotton. In some sections of the county it is recognized that a complete fertilizer of the formula 9—1—3 gives the best results on wheat and oats. This usually is applied at the rate of 300 to 400 pounds per acre. Some

¹ Percentages of phosphoric acid, nitrogen, and potash, respectively. At present little potash is used, owing to scarcity and high price.

farmers supply nitrogen by growing and turning under clover and cowpeas. These legumes materially increase the productiveness of the soil. Considerable stable manure is applied to wheat and corn land in some sections of the county. The use of lime on the soil was begun by a few farmers in 1915. The lime is applied principally to wheat and clover land, and good results are reported.

Farm labor in Stanly County is scarce. At Albemarle and Badin much public work is in progress, and the good wages paid have drawn many laborers from the farms. The farm laborers are principally white, although many negroes are employed. The prevailing price paid for labor is \$1 a day without board or \$15 to \$20 a month with board. For picking cotton 40 cents to 50 cents per 100 pounds is the usual pay. The cotton is picked mainly by women and children. A total expenditure of \$31,526, or \$73 for each of the 429 farms employing labor, is reported in the 1910 census.

The farms range in size from about 25 to 300 acres, most of them containing between 50 and 200 acres. The 1910 census reports the average size of farms at 90.7 acres.¹ Of the total area of the county, 83.3 per cent is reported in farms, and 39.4 per cent of the land in farms, or an average of 35.8 acres per farm, is reported improved. Of the total number of farms, which is given as 2,445, about 65 per cent are reported as operated by owners and the remainder by tenants. The number of farms operated by tenants has increased in recent years. A few of the tenanted farms are rented for cash, but most of them are operated on the share basis. Where the tenant furnishes work stock and fertilizer, the landlord receives one-fourth the crop. In some cases the landowner furnishes the stock and one-half the fertilizer and receives one-half the crop. When the tenant furnishes the stock and no fertilizer, the landlord receives one-half the crop.

Land values vary according to the character of the soil, the state of improvement of the farm, the topography, and the nearness to towns and railroad facilities. Near Albemarle land prices range from \$50 to \$100 or more an acre. In the vicinity of Badin values have been enhanced by the growth of the town and by the prospective development of additional water power on the Yadkin River. In the southwestern and northwestern parts of the county land is valued at about \$20 an acre and near railroad points at \$50 an acre. The average assessed value of land in this county is reported in the 1910 census as \$12.09 an acre.

SOILS.

Stanly County lies wholly within the Piedmont Plateau province. The soils may be classed with two general groups, residual and allu-

¹ The census tabulates each tenancy as a "farm."

vial. The residual soils have been formed directly from the underlying rocks through processes of disintegration and decomposition. The soils of this group cover almost the entire area of the county and mantle all the upland. The alluvial soils have been formed by the deposition of sediments by running water. They occur in narrow strips along the creeks and rivers. Soils of this group are of small extent in the county.

The rock formations of the county are included in two general groups, slates and intrusive dike rocks. The slates belong to the Carolina Slate Belt, a rock formation which extends through Stanly County and parts of Union, Cabarrus, Rowan, Anson, Montgomery, Davidson, and Randolph Counties. They underlie the greater part of Stanly County, and represent metamorphosed sedimentary rocks composed of volcanic ash and varying admixtures of land waste.¹ Associated with the slates are fine and coarse tuffs and breccias, rhyolite, and dacite. These rocks are massive in structure and do not show the slaty cleavage. The colors of the slates vary considerably. Fresh exposures range from dark green, dark and light blue, and gray to light gray and white. The weathered portions show shades of purple, deep red, red, yellow, and gray. These rocks are prevailingly very fine grained, and upon exposure to the weather soften and break into small, angular fragments and chips, which finally disintegrate into silt.

The second general group of rock formations includes the intrusive dike rocks. These are confined almost entirely to the eastern half of the county and occur in dikes that have cut their way through the associated slate formations. These dikes vary in width from a few feet to a mile or more, and have a general northeast-southwest trend. The rocks composing the dikes are igneous in origin and probably are diorite, diorite-gabbro, and gabbro. They are heavy, usually dark green in color, and have a medium-grained texture. Being more resistant to weathering than the slates, they have given rise to comparatively high areas of rolling and hilly topography, the land surface being characterized in many places by prominent hills and low mountains.

The first-bottom soils along the Yadkin and Pee Dee Rivers have been formed through the deposition of sediments brought down by the streams from the Appalachian Mountain and Plateau province and the adjoining Piedmont province. The first-bottom material along the Rocky River has been transported from the Piedmont Plateau uplands. The first-bottom soils along the creeks and small streams consist of sediments derived chiefly from the adjoining slopes.

¹ See Bul. No. 22, North Carolina Geological and Economic Survey.

The various soils are grouped into series, which include types, having a similar color, origin, structure, and topography, and differing only in texture. The soils derived from the slate formations are classed with two series, the Georgeville and the Alamance, and those formed from the igneous dike rocks with the Davidson and Iredell series and Rough stony land. The alluvial material along the streams is classed with the Congaree and Wehadkee series.

The Georgeville series is characterized by the gray to red color and predominantly silty texture of the surface soils and by the red silty clay subsoil. It is believed that the slate rocks giving rise to these soils are higher in content of iron-bearing minerals than those giving rise to the Alamance series. Four types of the Georgeville series are mapped in Stanly County, the stony loam, gravelly silt loam, silt loam, and silty clay loam.

The Alamance series is closely associated with and related to the Georgeville. The surface soils are white to light gray in color and have a silty texture. The subsoil consists of yellow, rather compact silty clay. Locally some of the types are known as "white land." Scattered over the surface are small, smooth, flat, and rounded particles and larger fragments of the parent rock. The soils of this series are derived from fine-grained slates. Three types are recognized in this county—the slate loam, gravelly silt loam, and silt loam.

The types of the Davidson series are characterized by dark-brown to reddish-brown and red surface soils and a deep-red or maroon, stiff, smooth clay subsoil. These soils are formed from diorite and diabase, and carry a lower percentage of silt than the soils of the Georgeville series. One type is mapped in Stanly County, the clay loam.

The surface soils of the Iredell series are dark gray to dull brown, and frequently carry small iron concretions. The subsoil consists of brownish-yellow or dingy-yellow, sticky, waxy, impervious clay. Greenish-yellow, soft, disintegrated rock is very often encountered within the 3-foot soil section. The rocks giving rise to this series are diorite, hornblende schist, and chlorite schist. Two members of the Iredell series are mapped, the stony loam and loam.

The soils of the Congaree series are brown to reddish brown, with little change in texture, structure, or color from the surface downward. Occasionally grayish and yellowish mottling is encountered in the subsoil of poorly drained areas. These soils occupy the overflowed first bottoms of streams of the Piedmont region and occur in similar positions in the Coastal Plain along streams issuing from the Piedmont. Two members of this series are encountered in Stanly County, the fine sandy loam and silt loam.

The surface soils of the Wehadkee series are gray or whitish, and have a compact, silty texture. The subsoil ranges in color from mottled gray and yellow to white, or is rusty brown. It is compact in structure, and prevailingly a silty clay. This series represents alluvial material derived from Piedmont soils. The soils are subject to overflow, and are closely associated with the Congaree soils. The Wehadkee series is represented by a single type in this county, the silt loam.

Rough stony land comprises areas that are too rough and stony for agricultural use.

The following table shows the actual and relative extent of the different soil types mapped in Stanly County:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Georgeville gravelly silt loam....	61,888	44.7	Alamance silt loam.....	8,320	3.2
Shallow phase.....	42,496		Georgeville stony loam.....	6,784	2.6
Steep phase.....	12,352		Davidson clay loam.....	5,696	2.2
Alamance slate loam.....	28,864	11.1	Iredell stony loam.....	4,992	1.9
Alamance gravelly silt loam.....	24,640	9.4	Congaree silt loam.....	3,968	1.5
Georgeville silt loam.....	21,312	8.2	Iredell loam.....	1,344	.5
Georgeville silty clay loam.....	16,448	6.8	Congaree fine sandy loam.....	640	.2
Steep phase.....	1,280				
Wehadkee silt loam.....	10,304	3.9	Total.....	261,120
Rough stony land.....	9,792	3.8			

GEORGEVILLE STONY LOAM.

The surface soil of the Georgeville stony loam consists of a yellowish-gray, yellowish-red, or reddish silty loam, 4 to 8 inches deep. This is underlain by a bright-red to dark-red, brittle silty clay subsoil, which grades at depths of 24 to 36 inches into the parent slate rock. Large quantities of angular slate fragments, varying in size from gravel to large stones, are scattered over the surface and embedded in both the soil and subsoil. In many places there is mixed with the slate fragments much fragmental quartz, and in other places fragments of diorite and gabbro are scattered over the surface. Large outcropping boulders of massive slate rock also occur.

The Georgeville stony loam is widely distributed over the county in rather small areas. The largest bodies are those about 1 mile south of Isenhour, southeast of Hatley School near Long Creek, west of Burleyson School, at and south of Flint Ridge School, west of Stanfield and Loves Chapel, west of Porter, and near Stony Mountain School. The type usually occurs on prominent hills or ridges and on steep slopes near streams. The topography is rolling to steep and broken. The drainage is good and in many places excessive.

This is an unimportant type agriculturally. About 85 per cent of it is forested, principally with oak, hickory, and pine, but with some dogwood, cedar, and persimmon. Small tracts of both forested and cleared land are in pasture. The stones have partly been removed from many of the cleared fields. A small proportion of the type is used for growing wheat, corn, cotton, and oats. These crops are fertilized in about the same way as on the Georgeville silt loam.

The selling value of this land depends largely upon the value of the timber.

This type probably should remain in forest, or, if cleared, sown to grass for pasturage. Some of the rolling areas could be used for peach and apple orchards.

GEORGEVILLE GRAVELLY SILT LOAM.

The surface soil of the Georgeville gravelly silt loam, sometimes called "red gravelly land," is a yellowish-gray to reddish-yellow silt loam, passing at 3 to 6 inches into a yellowish-red, heavy silt loam. The typical subsoil, beginning at a depth of 6 to 12 inches, is a bright-red silty clay which usually extends to 30 inches or more, and passes into the partially decomposed, pinkish and purplish slate rock. Scattered over the surface and disseminated through the soil are 15 to 50 per cent of small, rounded, reddish-brown iron or slate gravel and gray, angular slate particles, which render the soil distinctly gravelly.

There are noticeable variations in both the surface soil and subsoil of this type. In patches the former to a depth of 1 or 2 inches dries out to a gray color, and in forested areas there is usually a grayish shade. In the vicinity of New London, Millingport, and Locust the surface soil carries appreciable quantities of very fine sand. In places a few angular, massive slate fragments and white quartz rock are scattered over the surface. This type includes patches of Georgeville silt loam and silty clay loam too small to be separated on the map. In places the subsoil is a pinkish-red or salmon-red silty clay loam to silty clay, and near the boundaries of the Alamance soils it is frequently a yellowish-red silty clay. Occasionally the partly decomposed parent rock is encountered at 20 to 30 inches below the surface.

The Georgeville gravelly silt loam occurs in practically all parts of the county. The more prominent areas lie east of Richfield, south of New London, in the vicinity of Albemarle and Porter, around Cottonville and Aquadale, in the vicinity of Millingport, and in the southwestern part of the county near Red Cross and Stanfield and south of Philadelphia Church. The type occurs mainly in inter-stream areas, following the courses of the main ridges and in places occupying the slopes leading to the streams.

The topography ranges from almost level to gently rolling and rolling. As the streams are approached the surface usually becomes rolling to strongly rolling. Most of the land is well situated for farming. The drainage of both surface soil and subsoil is good. The surface soil is open and porous and consequently is not often eroded or gullied.

This is an important soil agriculturally, and about 75 to 80 per cent of it is under cultivation. The remainder is forested with red oak, white oak, post oak, blackjack oak, hickory, dogwood, sourwood, shortleaf pine, cedar, and sweet gum. Some areas are used for pasture.

Corn, wheat, cotton, and oats are the principal crops, the first three occupying about an equal acreage. Clover, cowpeas, rye, sorghum, and hay are grown to a considerable extent. On nearly every farm there are small patches of sweet potatoes, Irish potatoes, and garden vegetables, which are grown mainly for home use and for sale at local markets. Some apples, peaches, pears, figs, and grapes are produced.

Corn yields 20 to 60 bushels per acre; wheat 10 to 20 bushels, averaging about 12; oats 25 to 40 bushels; and cotton one-half to 1 bale.

The more important crops are fertilized, chiefly with a home mixture of 16 per cent acid phosphate and cottonseed meal. An acreage application of about 200 to 300 pounds of this mixture is commonly made for corn, wheat, and cotton. Some farmers use about 200 pounds per acre of an 8-2-2 or 9-1-3 mixture for wheat and oats. A few apply sodium nitrate as a top dressing for corn. In some sections clover and cowpeas are grown to add organic matter and nitrogen to the soil.

Land of the Georgeville gravelly silt loam ranges in value from \$20 to \$200 an acre, depending upon its state of improvement and nearness to markets and shipping points.

This soil is very deficient in organic matter. Liming, deeper plowing, and crop rotation are needed.

Georgeville gravelly silt loam, shallow phase.—The surface soil of the Georgeville gravelly silt loam, shallow phase, is a brownish, yellowish, or reddish silt loam, 6 to 8 inches in depth. The subsoil is a light-red to red, and in places reddish-yellow, silty clay loam, and is underlain at 10 to 18 inches by slate rock. From 30 to 80 per cent of the soil consists of smooth, rounded, reddish slate gravel and fine, angular slate particles scattered over the surface and distributed through the soil. In many places the gravelly surface soil rests directly upon the slate. Broken slate fragments frequently are turned up in plowed fields.

This phase carries more fragmental slate in the surface soil than the typical Georgeville gravelly silt loam, and this with the nearness

of the bedrock to the surface makes plowing more difficult than in the areas of the typical soil. Crop yields are somewhat smaller, and the moisture-holding capacity of the soil is lower in case of the phase.

This phase is encountered in nearly all parts of the county. The largest bodies lie about Palmerville, in the vicinity of and south of Albemarle, and around the headwaters and along the slopes of Big Bear, Little Bear, Long, and Mountain Creeks, and some of the smaller streams. Its principal occurrence is along the breaks and slopes adjacent to drainage ways.

The topography ranges from rolling to strongly rolling, the latter condition occurring near the streams. Owing to the prevailingly rolling surface the run-off is good and in places excessive. The open, porous structure of the surface material and the nearness of the slate rock to the surface favor the rather free downward passage of water, giving in places somewhat excessive underdrainage.

This phase is rather important agriculturally, and probably 60 per cent of it is under cultivation. The remainder is forested with oak, shortleaf pine, old-field pine, and hickory, with some dogwood, sourwood, cedar, and persimmon. The most important crops are corn, wheat, cotton, and oats. Clover and cowpeas are produced to a small extent, and potatoes, garden vegetables, and sorghum are grown, principally for home use. A small part of the phase is in pasture.

Crop yields in most cases are lower than on the typical soil. Corn yields 15 to 30 bushels per acre, wheat 8 to 12 bushels, oats 15 to 30 bushels, and cotton one-third to three-fourths bale. Practically the same fertilizer methods are followed as on the typical Georgeville gravelly silt loam.

The price of this soil usually is lower than that of the typical Georgeville gravelly silt loam. Some of it is sold in conjunction with the typical soil.

This phase can not be as highly improved as the typical Georgeville gravelly silt loam. Its chief need is organic matter and the conservation of soil moisture. Deep plowing is impossible in many places on account of the nearness of the bedrock to the surface. In such cases the incorporation of organic matter is especially important with the view of making the soil more retentive of moisture. The rotation of crops suggested for the Georgeville silt loam should be used on this phase. The more rolling areas should probably be used as pasture land, and more milch cows and beef cattle should be raised, to balance the farming system.

Georgeville gravelly silt loam, steep phase.—The surface soil of the Georgeville gravelly silt loam, steep phase, consists of a yellowish to reddish-yellow or brownish silt loam, 6 to 8 inches in depth. The subsoil is a bright-red, salmon-red, or yellowish-red, friable

silty clay, which extends to a depth of about 20 to 36 inches and grades into the disintegrated slate rock. Scattered over the surface and through the soil is from 15 to 60 per cent of reddish, rounded, smooth slate gravel and yellow and gray, angular slate particles. In many places larger slate fragments are scattered over the surface, and outcrops of the underlying rock occur. The slate is often encountered immediately below the surface soil, or below a few inches of the red silty clay subsoil material. This phase differs from the typical soil principally in topography, depth of the soil, and in productivity.

The steep phase is chiefly confined to the southern part of the county, occurring along Rocky River and the lower courses of Long Creek and smaller streams flowing into Rocky River. One area is mapped east of Isenhour, and another along Gum Creek. The phase is confined to steep slopes along streams. The topography is in places broken, and the phase is less desirable for farming than the typical soil. Surface drainage and underdrainage are thorough and in most places excessive, and terracing and the growing of cover crops are necessary to prevent erosion. Some contour terracing has been done.

This is one of the less important soils of the county agriculturally. Approximately 10 per cent of it is under cultivation. The remainder is forested, the growth consisting of oak, hickory, shortleaf pine, and some dogwood, sourwood, and cedar. Only the deeper and better lying areas are farmed. The most important crops are wheat, corn, and oats, with some cotton. Yields are somewhat lower than on the typical Georgeville gravelly silt loam. The fertilizer treatment is similar to that on the latter soil.

Land of this phase is generally sold in conjunction with better soils. Its value depends mainly upon the timber growth.

The greater part of this soil should remain in forest. Where cleared, it can best be sown to grass and used for pasture.

GEORGEVILLE SILT LOAM.

The surface soil of the Georgeville silt loam is prevailingly a gray, smooth silt loam, passing at 3 to 6 inches into a yellow or reddish-yellow, heavy, rather compact silt loam. The typical subsoil is a light-red silty clay loam which usually passes into a dull-red, brittle silty clay in the lower part of the 3-foot section. Small, rounded slate or iron particles occur scattered over the surface, but not in sufficient quantity to render the soil gravelly. Occasionally the surface soil is reddish yellow or reddish brown, and underlain by a deep-red, brittle silty clay subsoil. On the steeper slopes near the streams and draws the subsoil frequently grades into the partly decomposed, pinkish and purplish parent rock at 20 to 30 inches.

In a few patches, especially around the heads of draws, the surface mantle has been removed by erosion, leaving the red silty clay exposed. Some areas of Georgeville gravelly silt loam too small to be shown separately on the map are included in this type.

The Georgeville silt loam is confined almost entirely to the western and southwestern parts of the county. It occurs for the most part in one large and almost continuous area which extends southwestward from the vicinity of Houses Grove and Kendall Churches through the Millingport, Plyler, Bloomington, Lambert, and Locust sections to the southwestern corner of the county. Smaller areas are mapped near Isenhour, southeast of Norwood, and elsewhere. The type occurs mainly on rather high and broad interstream ridges.

Generally the topography is level to gently rolling or rolling, but near some of the small streams and draws it becomes strongly rolling. Both the surface drainage and underdrainage are good. The surface soil does not erode, except in some of the steeper areas near the streams. The subsoil, as a rule, is deeply weathered, and is retentive of moisture.

This is one of the more important soil types of the county agriculturally, and it includes some of the best farming land. Approximately 75 per cent of the type is under cultivation. The remainder is forested mainly with oak, hickory, shortleaf pine, and old-field pine, with some dogwood, gum, and cedar. Parts of both the forested and cleared areas are in pasture.

The most important crops grown on this soil are corn, wheat, cotton, and oats. With the exception of oats, each of these crops has about the same acreage. The corn and oats grown are chiefly fed to stock on the farms. Part of the wheat is sold for cash and the remainder is ground into flour for home consumption. Clover and cowpeas are grown to some extent, usually in rotation with other crops. They are grown both for hay and seed and for turning under. Sweet potatoes, Irish potatoes, garden vegetables, and sorghum are grown to some extent, mainly for home use. Peaches and apples are produced in a small way.

Corn yields range from 12 to 40 bushels per acre, wheat yields 8 to 15 bushels, oats 15 to 35 bushels, and cotton one-half to 1 bale.

Fertilizers are used for all crops on this type. The most popular fertilizer is a home mixture of 16 per cent acid phosphate and cottonseed meal. Commercial fertilizer of an 8-2, 8-3, or 9-3 formula is applied by some farmers. As a rule, wheat, corn, and cotton are given an acreage application of about 200 pounds of the home-mixed or commercial fertilizer. On some of the farms cowpeas and clover are grown or stable manure applied to increase the nitrogen content of the soil, and on a few liming has recently been introduced.

Land of this type sells at \$20 to \$50 an acre, the price depending mainly upon its state of improvement and the nearness to towns and transportation facilities.

This type is recognized as one of the strongest soils of the county, but it can be brought to a considerably higher state of improvement. It is deficient in organic matter, and this important constituent should be added by applying stable manure where available or by growing and turning under clover, cowpeas, rye, or grass. The application of about 1 to 2 tons per acre of burnt lime, scattered over the land just before turning under clover, cowpeas, or rye has been shown to be beneficial. A deeper seed bed should be provided for most of the crops grown. This can best be accomplished by plowing a little deeper each year. The rotation of crops would aid materially in keeping the soil in a good state of improvement. A good rotation, already used in some parts of this county, consists of: First year, corn; second year, wheat with clover, or wheat followed by cowpeas or rye to be plowed under; and, third year, oats. A good rotation including cotton is as follows: First year, cotton, followed by crimson clover in the fall; second year, corn, with cowpeas sown at the last cultivation; and, third year, wheat or oats followed by cowpeas. This rotation is successfully used in Union County.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the typical Georgeville silt loam:

Mechanical analyses of Georgeville silt loam.

No.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
234401.....	Soil.....	0.6	1.0	0.8	3.8	14.6	64.4	14.9
234402.....	Subsoil.....	.0	.2	.2	.8	6.4	38.7	53.9

GEORGEVILLE SILTY CLAY LOAM.

The surface soil of the Georgeville silty clay loam, locally called "red-clay land," is a light-red to red silty clay loam, 5 to 8 inches in depth. The subsoil is a deep-red, hard but brittle silty clay to a depth of 3 feet or more. In places reddish-brown, rounded slate gravel and yellow and gray, angular slate particles are scattered over the surface, but not in sufficient abundance to give the soil a gravelly texture. Frequently around the heads of draws and on the tops of small knolls red "gall" spots of heavy silty clay are exposed. These do not occur in large enough areas to be separated satisfactorily on the map. The subsoil in some places is dark red or light red, and frequently it grades into the decomposed, pinkish and purplish slate rock at 24 to 36 inches below the surface. In a few instances the slate rock either outcrops or lies just below the surface.

The typical surface soil frequently has a 1 to 2 inch covering of gray, yellowish, or yellowish-red silt loam, which resembles the surface soil of the Georgeville silt loam. This surficial material usually occurs where the two types grade into each other.

The Georgeville silty clay loam is largely confined to the eastern, southeastern, and southern parts of the county. The largest areas are mapped in the fork of the Peedee and Rocky Rivers south of Norwood, to the east and northeast of Norwood, south of Forest School, west of Stony Hill Church, near Lowders Ferry, west of Badin, along the Rocky River near Kennels, Davis, and Carpenter Fords, and in the western part of the county near Hatley School and Millingport. The type is encountered mainly on slopes leading to streams or at the base of the low mountains and prominent hills in the eastern section of the county. A small part of it lies around the heads of draws and small streams.

The topography ranges from gently rolling to rolling and strongly rolling. The surface of most of the type is favorable for farming. Surface drainage and the underdrainage are thorough, and in the more rolling areas the run-off is excessive, but owing to the deeply weathered nature of the subsoil crops rarely suffer from drought.

This is one of the more important soils of the county agriculturally. Approximately 85 per cent of it is under cultivation. The remainder supports a growth of shortleaf and old-field pine, with some oak, hickory, cedar, and persimmon. A small proportion of the type is in pasture.

The principal crops grown are wheat, corn, oats, and cotton. Wheat and corn each occupy a larger acreage than oats or cotton. A considerable acreage is devoted to clover, cowpeas, and rye. Sweet potatoes, Irish potatoes, garden vegetables, sorghum, and fruits are grown in a small way, principally for home use. Part of the wheat and all the cotton are sold for cash, while the corn and oats are practically all fed to stock on the farms.

Wheat ordinarily yields 10 to 15 bushels per acre. The highest yield reported is 21 bushels. Corn yields 20 to 40 bushels per acre, with a maximum of 60 bushels; cotton yields one-half to 1 bale, averaging about three-fourths bale; and oats yield 20 to 40 bushels per acre. This type, like the other Georgeville soils, is well adapted to red and crimson clover, rye, cowpeas, and grass. Clover yields as much as 1 ton of hay per acre.

All the important crops grown on this type are fertilized. The fertilizer practices are about the same as on the Georgeville silt loam. Some farmers use commercial fertilizers with the formulas 8-3, 9-3, and 10-2 for wheat, corn, and cotton. Lime is used by some farmers, being scattered broadcast over wheat fields in the fall. Some stable manure is applied to wheat, corn, and cotton land. Clover is grown

by many of the better farmers to supply organic matter and nitrogen. Wheat and corn give their best yields on clover sod.

Land of this type sells for \$20 to \$75 an acre, the price depending principally upon state of improvement and nearness to towns and shipping points.

The Georgeville silty clay loam can be built up to a high state of productiveness. The suggestions given for improving the Georgeville silt loam apply to this type. The addition of organic matter through the growing and turning under of clover, cowpeas, or rye, and the application of manure and lime will greatly improve the soil. The strongly rolling areas should be seeded to rye or grasses to prevent further erosion, or should be sown to grass and used for pasture. The soil is well adapted to clover and small grains.

Georgeville silty clay loam, steep phase.—The surface soil of the Georgeville silty clay loam, steep phase, is a yellowish-red to red silty clay loam, 5 to 8 inches in depth. It passes into a bright-red or dark-red silty clay subsoil, which extends to a depth of 24 to 36 inches and is underlain by partially decomposed pink or purple slate rock. In places the surface soil carries a small quantity of smooth, rounded, and angular slate gravel. Occasionally the slate rock lies near the surface or outcrops, and in such places a few slate fragments are scattered over the surface.

This phase is confined entirely to the southeastern part of the county. It is associated with the typical Georgeville silty clay loam, and occupies the steep areas in this type. The surface is in many places broken, and the phase is not well situated for farming. Owing to the steep topography, the drainage is excessive.

This is an unimportant soil agriculturally, and only about 5 per cent of it is under cultivation. The remainder is forested with oak, hickory, poplar, pine, and some dogwood, cedar, and persimmon. A small part of the cleared land is in pasture.

The crops grown and the yields obtained are about the same as on the typical Georgeville silty clay loam. The phase usually is sold in conjunction with the typical soil. Prices are controlled largely by the character of the timber.

The area of this soil probably should remain in forest or be used for pasture.

ALAMANCE SLATE LOAM.

The surface soil of the Alamance slate loam consists of a gray to light-gray silty loam, 4 to 6 inches in depth. The subsoil is a yellow heavy silt loam or silty clay, which passes at 10 to 18 inches into the disintegrated slate rock. Large quantities of small, platy particles of gray and blue slate are scattered over the surface and through the soil. These range in diameter from one-fourth inch to 2 inches or more, and prevailing are thin and flat. Occasionally

large fragments and bowlders of massive slate rock are scattered over the surface. In many places, especially on the steeper slopes, the surface mantle is immediately underlain by the partially disintegrated slate rock.

The Alamance slate loam is encountered in practically all sections of the county. The largest areas are located in the northwestern part in the vicinities of Wesley Chapel, Wagoner School, and New Bethel Church, near Richfield, north of Palestine, north of Albemarle, in the central and southwestern parts of the county near Pine Grove Church and Endy School, in the vicinities of Brooks School and Liberty Hill Church, around and north of Mission, northeast and east of Oakboro, in the vicinities of Oak Grove School, Hopkins Store, and Philadelphia Church, and south and southwest of Cedar Grove School. The type occurs as interstream areas and on slopes adjoining the streams.

In some of the broad interstream areas the topography is gently rolling to rolling, while nearer the streams it becomes rolling, strongly rolling, or steep and broken. In the gently rolling and rolling areas the surface drainage is good, but where the surface is strongly rolling and steep it is excessive. Because of the open and rather porous nature of the surface soil and the nearness of the underlying disintegrated slate rock to the surface, the underdrainage is in most cases excessive, and consequently crops do not withstand drought on this soil so well as on the deeper weathered soils.

This is not a very important soil agriculturally. Approximately 50 per cent of it is under cultivation, and the remainder is forested to white, post, and blackjack oak, with some red oak, pine, cedar, dogwood, poplar, and persimmon. A small part of the type is in pasture.

The important crops produced are corn, cotton, wheat, and oats. Clover and cowpeas are grown to a small extent. The yields of these crops are lower than on the Alamance silt loam. The fertilizer treatment is about the same.

This type sells for \$10 to \$40 an acre, depending upon its improvement and location with respect to towns and transportation facilities.

More of this type could be used advantageously for pasture. The steeper land should be left in timber. The farmed areas are in need of organic matter. The growing of clover is highly beneficial. To succeed with this crop it will be necessary to have the land well drained and to make a liberal application of lime and material carrying phosphoric acid in available form. On soils low in organic matter some nitrogen will have to be supplied to give the young clover plants a good start. Suitable inoculation will also have to be supplied to those soils on which clover has not been grown during the last five or six years.

ALAMANCE GRAVELLY SILT LOAM.

The surface soil of the Alamance gravelly silt loam is a light-gray, gray, or yellowish-gray silt loam, 5 to 8 inches in depth. The subsoil is a yellow brittle silty clay loam or silty clay extending to a depth of 20 to 36 inches, where it passes into the underlying slate rock. From 15 to 60 per cent of rounded, smooth, brown slate gravel and small, broken fragments of gray slate is scattered over the surface. In forested areas the surface is gray to dark gray. The subsoil of the flatter areas shows mottlings of gray in the lower part, and near the boundary of the Georgeville types it is reddish yellow or mottled with red. In places a small number of slate fragments are scattered over the surface.

With the exception of the extreme eastern and southeastern sections, the Alamance gravelly silt loam is encountered in nearly all parts of the county. The largest areas are located north and northeast of Richfield, northeast and east of Albemarle, north, northeast, and southeast of Aquadale, south and southwest of Oakboro, and along the Cabarrus County line. The soil occupies interstream areas and positions at the heads of streams. The surface ranges from almost level to gently rolling and rolling. The more nearly level areas are found north of Richfield, east of Albemarle, and in the vicinity of Oakboro. Practically all the type is well suited to farming. Except in a few depressions and flat areas, both the surface drainage and underdrainage are adequate. Where the decomposed slate rock lies within 20 inches of the surface, the subdrainage is excessive.

This is a rather unimportant soil agriculturally. About 60 per cent of it is under cultivation, the remainder being forested with a growth of white, post, and blackjack oak, hickory, and some cedar, dogwood, and sweet gum. A small part of the type is used for pasture.

The important crops are wheat, corn, cotton, and oats. Some clover and cowpeas are grown, and small quantities of hay are produced in the low areas, chiefly from wild grasses. Some sweet and Irish potatoes, sorghum, fruits, and garden vegetables are grown, mainly for home consumption.

Wheat yields 6 to 12 bushels per acre, corn 15 to 25 bushels, cotton one-fourth to three-fourths bale, and oats 15 to 30 bushels. Clover, cowpeas, and grass give fair yields. The main crops are fertilized in about the same way as on the Alamance silt loam.

This type sells for \$15 to \$60 an acre. Land values depend upon improvement and location with respect to markets and lines of transportation.

The Alamance gravelly silt loam is deficient in organic matter. This can be supplied by the application of stable manure or by the

growing and turning under of clover, rye, or cowpeas. The use of burnt lime or ground limestone, at the rate of about 1 ton to the acre, in the flatter areas would prove beneficial.

This type seems well adapted to grass, and more of both the forested and cleared areas could be used advantageously for pasture for beef cattle and dairy cows.

ALAMANCE SILT LOAM.

The surface soil of the Alamance silt loam is a light-gray to yellowish-gray, floury silt loam, grading at 2 to 5 inches into a pale-yellow silt loam which extends to a depth of 8 to 12 inches. The subsoil is a bright-yellow, friable silty clay loam. At 30 or 36 inches this passes into the parent slate rock. In places the dry surface soil is almost white, and in the forested areas and depressions it is gray to dark gray. In the flatter areas and depressions the subsoil is mottled with gray in the lower part, while in the better drained areas it frequently shows mottlings of light red. In many places small quantities of brown, rounded gravel and grayish, angular slate fragments are present on the surface, but not in sufficient quantity to give the soil a gravelly character. In the western part of the county south of Mission and in the vicinity of Red Cross and Locust the Alamance silt loam carries an appreciable quantity of very fine sand.

The Alamance silt loam is not very extensive in this county, and is confined mainly to the western section. The largest area lies south of Mission. Other areas occur in the vicinity of Eudy School, southeast of Richfield, and northeast and southeast of New Bethel Church. The type occupies interstream areas and positions around the heads of draws and small streams.

The topography varies from almost level to gently rolling and rolling. The more nearly level areas are south of Mission and north of Providence Church. This section is locally referred to as "the flatwoods." The surface drainage and underdrainage for the most part are adequate, but there are a number of small depressions and swales about the heads of draws which have poor subdrainage.

Approximately 60 per cent of the Alamance silt loam is under cultivation; the remainder is forested with white, post and black-jack oak, with some cedar, dogwood, and sweet gum. The type is one of minor importance.

The chief crops are corn, cotton, wheat, and oats. Considerable hay is produced in the depressions and around the heads of draws. Wheat yields 6 to 10 bushels per acre, corn 12 to 25 bushels, cotton one-fourth to three-fourths bale and oats 15 to 25 bushels. The soil usually is fertilized with 200 to 400 pounds per acre of a mixture of

16 per cent acid phosphate and cottonseed meal. Some commercial fertilizer is used. Clover is grown to a small extent.

Land of this type sells for \$15 to \$30 an acre, depending upon conditions of improvement and nearness to towns and shipping points.

The Alamance silt loam is deficient in organic matter, and the poorly drained areas are in need of lime. To grow leguminous crops successfully it will, no doubt, be found necessary to use lime on this as well as on practically all soils of the county. In connection with liming properly balanced fertilizer mixture must be used to assure success with these crops. A large part of the type apparently is best suited for use as pasture.

DAVIDSON CLAY LOAM.

The surface soil of the Davidson clay loam is a dark-red or reddish-brown clay loam, ranging in depth from 5 to 10 inches. The subsoil is a deep-red or maroon, stiff, smooth clay, extending to a depth of 36 inches or more. A few "gall," or eroded, spots in which the surface material consists of red clay, are included. These are too small to be shown satisfactorily on the soil map. Scattered over the surface in places are a few fragments and small boulders of diorite and other dark-colored igneous rocks.

This soil differs in origin of material from the Georgeville and Alamance soils, being formed from diorite and diabase and probably other igneous rocks, instead of slate. It is comparatively inextensive in this county, and confined entirely to the northeastern part. The largest area extends from near New London northeastward to Whitney and the Yadkin River. Smaller areas are located on and around Palmer Mountain, at Badin, around and east of Kirks School, southwest of Harwood School, and west and northwest of Albemarle. The type occurs on the crests and slopes of high, broad ridges and on the slopes and at the bases of prominent hills.

The topography is gently rolling to rolling, and in a few places strongly rolling. Both the surface drainage and underdrainage are good. The run-off on the strongly rolling areas is excessive and eroded spots occur, in which the reddish clay subsoil material is exposed.

This is an important soil, although of relatively small extent. About 65 per cent of it is in cultivation, the remainder supporting a forest mainly of oak and hickory, with some dogwood, sourwood, poplar, and pine.

Wheat, corn, and oats are the important crops on this soil. Some cotton is grown, and clover is produced to a small extent. Wheat yields 10 to 20 bushels per acre, corn 30 to 40 bushels, oats 20 to 35 bushels, and cotton one-half to 1 bale. Clover does well. The chief

fertilizer used is a mixture of 16 per cent acid phosphate and cottonseed meal. This is applied at the rate of 200 to 400 pounds per acre. Commercial mixtures are used on a few of the farms.

This soil sells for \$30 to \$70 or more an acre, the price depending upon the state of improvement and nearness to towns and lines of transportation.

This is the deepest weathered soil in the county and probably the strongest. It can be built up to and maintained in a high state of productiveness. The suggestions made for the improvement of the Georgeville silt loam apply to this type.

The Davidson clay loam is well adapted to wheat and clover. In Davidson County, N. C., it is considered the best type of soil for these crops. It is also well suited to the growing of alfalfa, and in the vicinity of Rock Hill, S. C., is being used successfully for the production of this crop.

In the following table are given the results of mechanical analyses of samples of the soil and subsoil of the Davidson clay loam:

Mechanical analyses of Davidson clay loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
234411.....	Soil.....	1.0	2.4	2.0	8.2	10.6	43.9	32.1
234412.....	Subsoil.....	1.2	1.4	.9	3.2	5.0	30.0	58.4

IREDELL STONY LOAM.

The surface soil of the Iredell stony loam is a brown to grayish-brown loam, passing at a depth of about 6 inches into a yellow or brownish-yellow loam or silty loam. The subsoil is encountered at about 8 or 10 inches, and consists of a yellow to yellowish-brown, heavy, impervious, plastic clay. This grades at a depth of 20 to 30 inches into the partially decomposed diorite. Iron concretions and small fragments of the parent rock are present on the surface and in the soil. Fragments of diorite and massive slate ranging in diameter from 2 to 12 inches and a few boulders of the same rocks are scattered over the surface and embedded in the soil.

The Iredell stony loam is confined to the eastern part of the county. The largest areas are located north of Kirks School, about 2 miles west of Lowders Ferry, northwest and west of Albemarle, northeast and east of Porter, and around and southeast of Rock Hill School. Smaller areas are found elsewhere in the eastern part of the county. Three small areas are located in the northwestern part of the county near New Bethel Church. The type for the most part occupies prominent hills and ridges. The topography is rolling, strongly rolling, or hilly, and the surface drainage is good to excessive. The underdrainage, however, is retarded by the impervious subsoil.

The Iredell stony loam is not an important agricultural soil. Probably less than 10 per cent of it is under cultivation, the remainder being in timber, consisting of white, post, red, and black-jack oak, hickory, and some dogwood, cedar, pine, and sourwood.

The small part cultivated is devoted to the production of wheat, corn, cotton, and oats. These crops give fair yields.

The Iredell stony loam usually is sold in connection with the better types of soil.

Under present conditions this type should probably remain in timber. If cleared, some parts might be used for apple orchards, and all of it would make pasture lands.

IREDELL LOAM.

The surface soil of the Iredell loam is a dull-brown to grayish-brown loam, passing at 3 to 6 inches into a yellowish loam, which extends to a depth of 6 to 10 inches. The subsoil is a brownish-yellow, soft, plastic, impervious clay, which grades into the greenish or yellowish-green diorite rock at depths of 15 to 30 inches. Noticeable quantities of small, dark-brown ironstone concretions, and occasionally particles of the parent rock, are scattered over the surface and disseminated through the soil. A few diorite bowlders are present in places on the surface. In a few places the surface soil is a gray or dark-gray silt loam or silty loam. The type locally is called "bull-tallow land" or "blackjack oak land."

The Iredell loam is found chiefly in the eastern part of the county and is of comparatively small extent. The largest bodies lie northeast of New London, in the vicinity of Forest School, and east and southwest of Norwood. Smaller areas are encountered in other parts of the eastern section of the county.

This type usually occurs on ridges and has a gently rolling to rolling topography. The surface drainage is good, but the under-drainage, owing to the impervious nature of the subsoil, is poor.

This is not an important soil. Probably 65 per cent of it is under cultivation and the remainder is forested. The timber growth consists of white, post, blackjack, and red oak, hickory, and some sweet gum, dogwood, and cedar.

Wheat, corn, cotton, and oats are the principal crops, and these give fair yields. There are a few patches of alfalfa on this type, and good yields of hay are produced. The main crops are generally fertilized, an acreage application of 200 to 400 pounds of 16 per cent acid phosphate and cottonseed meal being used.

This soil usually is sold in conjunction with land of the adjoining types.

CONGAREE FINE SANDY LOAM.

The Congaree fine sandy loam consists of a brown, light fine sandy loam or loamy sand, 10 to 12 inches deep, underlain by either a lighter colored fine sandy loam or friable clay. This type is variable in texture and structure. The material is subject to frequent change by the addition of fresh deposits or the removal of the sand in periods of heavy overflow. A few narrow strips of medium to coarse, incoherent, gray to light-brown sand adjoin the stream beds as bars. Small spots of the Congaree loam and silt loam occur in some of the swales and depressions.

This type occurs in narrow strips along the Yadkin and Peedee Rivers and in smaller belts along the Rocky River. The surface is undulating to ridgy. The type lies slightly higher than the Congaree silt loam and has good natural surface drainage. It is subject to overflow in periods of high water.

About 50 per cent of the Congaree fine sandy loam is under cultivation. The remainder is forested with willow, birch, and some sycamore. Cultivated areas are used mainly for the production of corn, and to a small extent for oats and rye.

The heavier areas produce fair yields of corn without fertilization. In the lighter textured spots watermelons are grown successfully. This crop does best where manured or fertilized.

CONGAREE SILT LOAM.

The Congaree silt loam consists of a chocolate-brown or reddish-brown, friable silt loam, underlain at depths of 8 to 15 inches by a light-brown to brownish-yellow, compact silt loam or silty clay loam, which continues to a depth of 36 inches or more. Along the rivers the soil carries a noticeable quantity of finely divided mica flakes, but the areas bordering Long and Mountain Creeks are free from mica. In the poorly drained depressions the subsoil shows mottlings of yellow and gray. Occasionally a thin substratum of yellowish sand is encountered.

The Congaree silt loam is an alluvial soil, and is confined to the first bottoms of the Yadkin, Peedee, and Rocky Rivers, and Long and Mountain Creeks. The widest area extends along the Peedee River from Parker Mill to the mouth of Rocky River.

The topography is prevailingly level to gently rolling, with a gradual slope toward the streams and in the direction of their flow. Owing to the generally level surface, the natural surface drainage and underdrainage are poor. Ditching in many of the lower areas is necessary to provide adequate surface and internal drainage. This soil is subject to occasional overflows from the streams, but the water remains on the surface for only short periods of time. Crops, however, frequently are damaged by these overflows.

This is an important soil, although it has only a small acreage in the county. Approximately 70 per cent of it is under cultivation. The remainder supports a forest of willow, birch, and sycamore. Water-loving species are conspicuous among the smaller plants.

Corn and hay grasses are the important crops. Oats are grown to some extent. Some melons are grown for home use and for local markets. Corn yields 30 to 50 bushels per acre without fertilization. The grasses yield about 1 ton of hay per acre. Two to three cuttings are made each season.

The price of the Congaree silt loam depends upon the value of the adjoining upland soils, in connection with which it usually is sold.

WEHADKEE SILT LOAM.

The surface soil of the Wehadkee silt loam is a gray, yellowish-gray, or mottled brown and gray, smooth silt loam 6 to 10 inches deep. The subsoil is a mottled yellow and gray or mottled yellow, gray, and brown silty clay loam, which extends to a depth of more than 36 inches. Frequently the surface soil adjoining areas of the Alamance soils is light gray to white, and where the type borders areas of the Georgeville soils it is sometimes reddish brown. In places near some of the stream bars and narrow ridges finely broken slate fragments occur, and frequently larger pieces of slate are scattered over the surface. The subsoil in many places begins as a yellow silt loam or silty clay loam, resembling the Alamance subsoil, and passes into the mottled gray and yellow or brown silty clay loam at 24 to 30 inches. In a few instances the slate bedrock is encountered at a depth of 24 to 30 inches.

This type has only a small total area in the county. It is a first-bottom soil, and is confined to narrow strips along many of the creeks and branches. The widest areas are encountered along Little Mountain, Mountain, Long, Big Bear, Stony Run, and Island Creeks.

The topography of this type is generally level to gently undulating, with a gentle slope in the direction of the flow of the streams. The surface is only a few feet above normal water level, and the type is subject to frequent overflow. The surface drainage and underdrainage are poor. Ditching is necessary to provide good drainage.

The Wehadkee silt loam is one of the unimportant soils of the county. About 55 or 60 per cent of it is either under cultivation or in hay land. On the rest of the type the vegetation consists of sweet gum, ash, willow, and birch, with smaller water-loving plants. A small part of the type is used for pasture.

Corn and hay grass are the main crops. Oats and wheat are grown to a small extent. Corn yields 15 to 35 bushels per acre with-

out the use of fertilizer, and yields of as much as 75 bushels are reported. Good yields of hay are obtained.

This type usually is sold in conjunction with the adjoining upland soils, and its value depends largely upon that of the associated types.

ROUGH STONY LAND.

To a depth of 4 to 8 inches the interstitial soil material of Rough stony land is a gray to yellowish or reddish silt loam, loam, or gravelly loam, or a red clay loam. Where there is a subsoil it consists usually of red, friable clay, or yellowish-brown or dull-brown, plastic, impervious clay, extending to a depth of 20 to 36 inches or more. In places it is similar to the subsoil of the Davidson series, and in other places it corresponds with that of the Iredell series. Boulders of diorite and slate rock ranging from a few inches to several feet in diameter are scattered over the surface and embedded in the soil.

The Rough stony land is confined entirely to the eastern part of the county, near the Yadkin and Peedee Rivers. The largest areas are east and northeast of New London, and south and southeast from Badin to Zoar Church. For the most part it occupies hills and low mountains. The topography is strongly rolling to steep, rough, and broken, and the drainage is excessive.

Rough stony land is unsuited to agriculture on account of its rocky nature and rough topography. It is forested with oak, hickory, pine, and some dogwood, sourwood, and cedar. It is best suited to forestry.

SUMMARY.

Stanly County lies in the south-central part of North Carolina. It has an area of 408 square miles, or 261,120 acres. The topography varies from almost level to gently rolling, rolling, steep, and broken, the greater part being rolling. The elevation above sea level ranges between 300 and 700 feet. The drainage of the county is effected through the Yadkin, Peedee, and Rocky Rivers and their tributaries. The regional drainage is complete.

The population of the county in 1910 was 19,909, all classed as rural.

Albemarle is the county seat and the largest town. Smaller towns of local importance are Norwood, Badin, New London, and Oakboro.

Railroad facilities in the eastern and southern parts of the county are good. Public roads extend to all sections of the county, and are kept in a fair state of repair.

Albemarle is the principal market for the products of the county.

The climate is mild and healthful. The mean annual temperature is about 60° F. The rainfall is adequate for a successful agriculture,

the annual mean precipitation being about 47 inches. The county has an average growing season of nearly 200 days.

The agriculture of Stanly County consists chiefly of the production of corn, wheat, cotton, and oats. The crops of minor importance are rye, cowpeas, hay, and potatoes. A few cows and hogs are kept on the farms, mainly to supply the home with meat, milk, and butter. Cotton, and to some extent wheat and corn, are money crops.

The farmhouses are substantial and well kept, and improved farm machinery is in fairly general use over the county. The rotation of crops is practiced to some extent. Fertilizers are used throughout the county.

Over 80 per cent of the area of the county is in farms and 39 per cent of the land in farms is improved. Most of the farms contain between 50 and 200 acres, the average size being about 91 acres. About 65 per cent of the farms are operated by the owners, and the rest by tenants. Farm land sells for \$20 to \$100 or more an acre.

Stanly County lies wholly within the Piedmont Plateau province, and the soils, except for a relatively small area of alluvial soils, are residual, being derived from the underlying rock formations. The rock formations comprise slates, occupying by far the greater part of the county, and diorite, diabase, and other igneous dike rocks. The soils derived from slate are classed with the Georgeville and Alamance series and those derived from the igneous dike rocks with the Davidson and Iredell series. The alluvial soils are correlated with the Congaree and Wehadkee series. Thirteen soil types, exclusive of Rough stony land, a nonagricultural type, are mapped in Stanly County. The more important soils are the Georgeville gravelly silt loam, Georgeville silt loam, Georgeville silty clay loam, Davidson clay loam, and Congaree silt loam.

The Georgeville gravelly silt loam is widely distributed through the county. It has a nearly level to rolling topography and good drainage. Over three-fourths of the type is under cultivation. Corn, wheat, cotton, and oats are the important crops, and good yields are produced. The crops usually are fertilized. This type sells for \$20 to \$200 an acre.

The Georgeville silt loam is a level to rolling, well-drained soil adapted to general farming. About three-fourths of the type is in cultivation. Corn, wheat, cotton, and oats are the leading crops. With fertilization, good yields are obtained. This land is valued at \$20 to \$50 an acre.

The Georgeville silty clay loam is locally called "red-clay land." The surface is gently rolling to strongly rolling, and drainage is thorough to excessive. About 85 per cent of this type is cultivated, mainly to wheat and corn, though oats and cotton are important

crops. All the crops grown give good yields. Fertilizers are in common use. Land of this type is sold for \$20 to \$75 an acre.

The Davidson clay loam is gently rolling to rolling, and in places strongly rolling. Drainage is good to excessive. About 65 per cent of this type is cultivated. Good yields of wheat, corn, and oats are obtained. Fertilizers are commonly used. This land is valued at \$30 to \$70 or more an acre.

The Congaree silt loam is a naturally poorly drained alluvial soil of level to gently rolling topography. It is subject to occasional overflows, which sometimes injure crops. The type has only a small extent in this county, but about 70 per cent of it is in cultivation. Corn and hay are the principal crops. Heavy yields are obtained without fertilization.



[PUBLIC RESOLUTION—No. 9.]

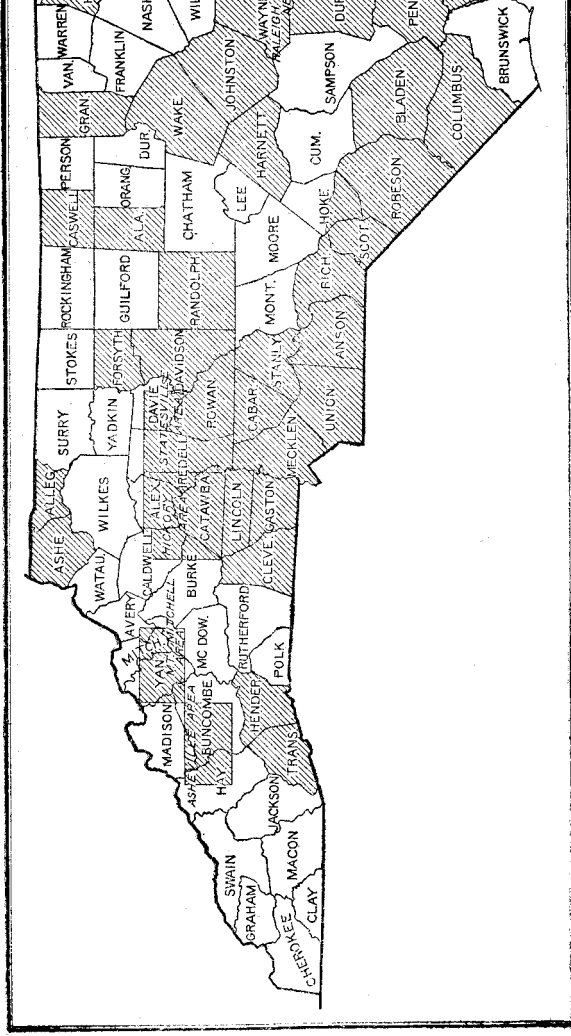
JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, be amended by striking out all after the resolving clause and inserting in lieu thereof the following:

That there shall be printed ten thousand five hundred copies of the report on field operations of the Division of Soils, Department of Agriculture, of which one thousand five hundred copies shall be for the use of the Senate, three thousand copies for the use of the House of Representatives, and six thousand copies for the use of the Department of Agriculture: *Provided*, That in addition to the number of copies above provided for there shall be printed, as soon as the manuscript can be prepared, with the necessary maps and illustrations to accompany it, a report on each area surveyed, in the form of advance sheets, bound in paper covers, of which five hundred copies shall be for the use of each Senator from the State, two thousand copies for the use of each Representative for the congressional district or districts in which the survey is made, and one thousand copies for the use of the Department of Agriculture.

Approved, March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils.]



Areas surveyed in North Carolina.

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